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ABSTRACT

A review of the research literature concerning the effects of cooperation and competition on small-group productivity suggests that results have been conflicting and inconclusive. From a methodological standpoint, the inconsistent finings result from the use of experimental tasks which create systematic bias in favor of either the cooperative or the competitive condition. The relative merits of cooperative and competitive behaviors are dependent on three situational variables: the type of task involved, the age of the subjects, and their attitudes toward cooperation and competition. A table summarizing the results from 33 relevant studies is included as an appendix. (AA)

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AN EXAMINATION OF THE CONSEQUENTIAL EFFECTS OF COOPERATION AND COMPETITION ON GROUP PRODUCTIVITY: A METHODOLOGICAL APPROACH

By

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The relative merits of cooperation and competition in small groups have been a source of much interest to small group communicologists. Raven and Eachus suggest that the problem of determining the effects of cooperative and competitive behaviors on group functioning is one of the oldest problems in the field of social psychology and small group research.[1] Although the specific effects of cooperation and competition are far from completely understood, small group communicologists have generally taken a hard stand against the establishment of a competitive atmosphere in small group facilitation. Brilhart, for example, suggests that "cooperation is paramount to discussion . . . all members of a discussion group must cooperate in the search for a group product that will be satisfactory to all."[2] Deutsch, both theoretically and empirically, suggests that group members who are cooperatively interdependent in the service of some task tend to be friendlier and mutually more influential, and otherwise give evidence of higher cohesiveness than do similar groups acting in a competitive manner.[3] Horney argues that competition among individuals in small groups is a major cause of interpersonal conflict.[4] Haines and McKeachie suggest that cooperation within discussion groups, when compared to competitive groups, leads to reduced tension and greater motivation among the group members.[5]

Small group communicologists have made similar assumptions concerning the effects of cooperation and competition on group productivity. Generally speaking, small group communicologists

have assumed that cooperation among group members is an inherently better facilitator of group productivity than competition. Shaw suggests that the empirical evidence makes it "adundantly clear" that cooperation ("homogeneity of group goals") facilitates group functioning, whereas competition ("heterogeneity of group goals") interferes with group functioning.[6] Similarly, Patton and Giffin suggest that "when we compare the comparative results of cooperative and competitive orientations, the conclusion is inescapable that groups should work to acheive cooperative, integrative behavior."[7] Burgoon, Heston, and McCroskey likewise argue that "there is a great wealth of research to show that cooperation within a small group results in more productivity and member satisfaction (and that) people tend to be happier working with cooperative people and often the end result is a better decision or a higher quality product."[8]

A careful review of the literature concerning the consequences of cooperation and competition on group productivity, however, suggests that the empirical evidence does not necessarily make it "abundantly clear" that cooperation always leads to greater group productivity. Quite contrarily, the literature suggests some conflicting and outright contradictory information. Phillips, for example, suggests that small groups of elementary school children seem to perform intellectual tasks more efficiently under competitive conditions than under cooperative conditions. In fact, Phillips noted that his competitive groups appeared to be more motivated than the cooperative groups.[9] Triplett[10]; Maller[11]; and Whittemore[12] all similarly reported

that groups operated more rapidly under competitive situations. Similarly, Weinstein and Holzbach found that their competitive condition resulted in higher productivity than their cooperative condition when the multiple reinforcement contingencies were congruent.[13] The contradictory empirical findings are amply documented in Miller and Hamblin's literary review. They found that of the 24 studies which were reviewed, 14 indicated that competition produced greater productivity than cooperation, while ten others indicated that cooperation resulted in greater productivity than did competition.[14] A more recent up-date of Miller and Hamblin's original review arrives at similar conclusions. Of the 31 studies reviewed by this writer, 15 indicated that competition resulted in greater productivity, while 16 indicated that cooperation was more productive.[15] Appendix One provides a brief table digest of that review.

Clearly than, the empirical evidence does not conclusively indicate that cooperation is superior to competition in so far as increasing group productivity is concerned. What does seem clear, however, is the fact that cooperation and competition represent social processes whose effects on group productivity and functioning are far from completely understood.

In light of the obviously inconsistent information, two important questions become apparent: (1) Why are the empirical findings inconsistent? and (2) Does the empirical evidence really suggest that cooperation is an inherently better facilitator of group productivity than competition? In response to the first question, if one approaches the inconsistency from a methodological point of view, two possible explanations can be

advanced: (1) Not all the studies reflect a comparison between cooperation and competition; and (2) The nature of the tasks employed varies considerably from study to study. In response to the second question, it can be argued that the methodological flaws in the existing studies greatly limits the conclusions that one can legitimately draw from the present empirical findings concerning the consequential effects of cooperation and competition on group productivity; and in effect, the only legitimate conclusion that can be drawn at the present time is that the desirability of cooperation and competition may be situationally bound. That is to say, the only conclusion that can be drawn from the existing evidence is simply that the consequences of cooperation and competition on group productivity are intimately woven with certain situational variables. The remainder of this paper thus: (1) Explores into the two suggested explanations for the inconsistent empirical findings; and (2) Briefly examines the possibility that the desirability of cooperation and competition is situationally bound.

First of all, the inconsistent findings become more understandable if one carefully considers the actual experimental conditions that were compared. Quite clearly, the available literature indicates that in some instances, competition was not necessarily compared to cooperation. Particularly in the earlier studies (i.e., Triplett; Whittemore; Maller), although competition was found to be more productive, an examination of the actual experimental conditions clearly indicates that what was compared was not cooperation and competition, but rather, competition and non-competition. In Triplett's study, for

example, subjects were required to individually turn a reel which caused a flag to go around a four meter track. The criterion for productivity was the time required to make the flag go four times around the track. Clearly, the operation of the apparatus was essentially a one-man operation, and so the only comparisons that could really be made were between competing and non-competing individuals. Similarly, in Whittemore's study, groups in both conditions were asked to print letters using individual rubber stamps. Productivity in this case was measured in terms of the amount of items correctly handled by the subjects in both conditions. As in the Triplett study, however, the conditions were such that the actual comparison was again between competition and non-competition. That is to say, the experimental conditions were set up such that the subjects either competed ("raced") against each other, or else worked independently (non-competition). At no time in either the Triplett or Whittemore studies were "cooperation" conditions actually set up.

Clearly, it does not seem justifiable to compare both Triplett's and Whittemore's operational definitions of non-competition to common usage of the term "cooperation." Traditionally, the term "cooperation" has been used to identify a situation in which no individual reaches his goal unless all other individuals also enter their goal regions. "Non-competition," on the other hand, generally denotes a situation that is void of any competitive activity--that is to say, a situation in which every member can reach his goal without depending on, or interfering with any other member's desire to reach his goal. In essence, cooperation

suggests a condition of mutual sharing and interdependence, whereas non-competition simply suggests an absence of competition. Clearly, a comparison of the two conditions is ungrounded since a condition of cooperation may be non-competitive, but a condition of non-competition may not be cooperative.

Secondly, I believe that the discrepencies in the empirical findings become more understandable if one recognizes that there were considerable differences in the kinds of tasks employed in the various studies of cooperation and competition. Specifically, it can be argued that critical "internal differences" between tasks could have been responsible for the inconsistent findings concerning the relative merits of cooperative and competitive behaviors on group productivity. A consideration of the empirical findings suggests that one such "internal difference" may well be the degree of group effort (member interdependency) that a particular task requires in order to be successfully completed. That is to say, the evidence seems to indicate that the completion of certain assigned tasks required that all members work collectively; whereas certain other tasks did not require such a group effort. In essence, the evidence seems to suggest the possibility that cooperation is more likely to lead to greater productivity when the successful completion of a task requires that every group member depend on and share with every other group member; whereas competition is more likely to result in greater productivity when the successful completion of a task requires parallel, but individualized effort. Hence, the possibility exists that the consequential effects of cooperative abd competitive behaviors on group productivity may be dependent

on the type of task at hand; and to the extent that these tasks differ, so will the results of the findings that relied on that task differ. Perhaps a consideration of some of the existing studies will help to clarify, and hopefully substantiate this causal claim.

In Miller and Hamblin's study,[16] for example, groups in both the cooperative and competitive conditions were required to determine which of 13 numbers had been selected by the experimenter. In each condition, members were privately informed of four numbers that had not been selected. Groups in both conditions were composed of three members, and since there were only 13 numbers, it seems quite obvious that the sharing of information would be the most logically effective method of determining the number selected by the experimenter. In fact, it seems obvious that the only procedure that would lead to a consistently successful determination of the chosen number would be the voluntary sharing of individual information (i.e., the four unchosen numbers given to each member) with other members of his or her group. Given this necessity for sharing information, it is not surprising that the cooperative groups fared considerably better than the competitive groups since the experimental conditions were set up in such a manner that the group members in the cooperative condition were willing to share their information; but the group members in the competitive condition had no choice other than to guess.

In Thomas' study,[17] the task required groups in both conditions to assemble miniature houses. The building of the houses followed five basic steps: (1) Tracing the patterns for the

walls and roof; (2) Cutting out the patterns; (3) Scoring selected folding parts; (4) Gluing the house together; and (5) Painting the house. Since the subjects in both the cooperative and competitive conditions were alloted only thirty minutes in which to complete as many houses as possible, it seems obvious that the groups that were able to divide their labor most effectively were the groups that would have the highest level of productivity. That is, given the nature of the task, as well as the time limitations, it seems clear that an "assembly line" procedure (i.e., one group member is assigned to trace the patterns, another group member is assigned to cut out the patterns, etc.), as compared to an "individual production" procedure (i.e., each member builds his own house), would have a far better chance of producing more houses within the alloted period of time. Here again, it is not hard to realize that such a task gives a distinct advantage to the cooperative groups since the sharing of labor is essential to the most rapid and efficient group production. However, not only are these "biases" present in mechanical tasks, but they also appear to be present in studies involving discussion tasks.

In Grossack's study,[18] groups in both conditions were required to discuss a short case study of a delinquent boy. The subjects were asked to first consider the problem from the point of view of a person responsible for the boy's future treatment, and then, as a group come up with a written solution to the problem. In the competitive condition, the subjects were told that they would be evaluated individually; while in the cooperative condition, the subjects were told that they would be evaluated as

a group. Since the measure of efficiency was the "quality" of each written solution, it again seems obvious that the co-operative groups stood a better chance of coming up with a "quality" solution since the members within these groups could share their ideas with their fellow members, and in so doing, develop a refined "group solution." On the other hand, the groups in the competitive condition were faced with an obstacle since they were less likely to voluntarily share their information, and thus also benefit from the ideas and insights of their fellow members. The point is that the nature of the task made it obvious that the groups that were willing to share would almost invariably come up with "better" solutions, since these solutions would most likely represent the collective thinking of a number of individuals.

In a similar sort of study, Hammond and Goldman[19] asked subjects in both conditions to discuss and later come up with solutions to four human relations problem situations. Each group was asked to come up with written reports which presented the group's solutions to each of the four problems. An evaluation of the written reports served as the criterion for efficiency. In this case, one point was given for each alternate course of action presented by the group, as well as each logically related set of consequences for that course of action. Thus, the more actions and consequences the group produced, the greater was their supposed productivity score. Here again, it would not be unreasonable to suggest that the nature of the task gave a clear advantage to the groups that were willing to work together. That is to say, the criterion for success was such that the more

group members were able to collaborate and share their ideas, the greater was their chance of producing a greater amount of possible actions and consequences per unit time. Haines and McKeachie, as well as Smith et. al. employed similar discussion problems, and in both cases, cooperation was found to be more productive than competition.[20] In sum, it seems clear that when the successful completion of a task requires that group members cooperate and help each other (high interdependency), the only reasonable procedure for the group to follow would be one of cooperation, rather than competition.

However, it should not be assumed that the systematic bias is always in favor of cooperation. Quite contrarily, when one considers the studies that have found competition to be more productive than cooperation, one can clearly see a systematic bias going in the direction of the competitive groups. That is to say, just as the employment of tasks which require high interdependency, give an unequal advantage to the cooperative groups, so also does the employment of means-independent tasks give an unequal advantage to the competitive groups.

In Phillips' study,[21] for example, the task employed was a game called "Twenty Questions." Here, the subjects in both the cooperative and competitive conditions were required to identify, by asking yes-and-no questions, animals selected by the experimenter. The criterion for efficiency was the number of questions required to name the animal. Unlike the tasks employed in many of the studies which found cooperation to be more productive than competition, Phillips' task did not require group members to share information. In other words,

although sharing of information was possible, the actual sharing of information was not a crucial prerequisite for solving the problem. That is to say, Phillips' task was such that any subject could easily solve the problem (i.e., guess the animal) without any assistance from other members of his group. Quite similarly, in Forlano's study, a simple cancellation test was employed. In this instance, subjects in both the cooperative and competitive conditions were required to cancel out as many "e's" as possible within a designated period of time. The criterion for efficiency was the number of "e's" that the subject cancelled out within a one-minute period. As in the Phillips' task, the task employed by Forlano did not require subjects to share information in order to successfully complete it. In fact, the nature of the task was such that the only reasonable way for subjects to complete the task was to work individually--cooperative work would seem like a very inappropriate method for completing the task.[22] A similar sort of clerical task was employed by Sims, with the major difference being that the subjects were asked to substitute digits for letters in a given paragraph.[23] Similar means-independent tasks were likewise employed in studies by Scott and Cherrington[24]; as well as Sorokin et. al.[25], and in each case, competition was found to be more productive than cooperation. The point in each of the cases mentioned above is simply that the nature of the task was such that the existence of cooperative behaviors really had little or no effect on the subjects' ability to produce more. To put it simply, it would appear that cooperation is an inappropriate method of facilitating group productivity when the task at hand does not demand

cooperation or sharing among group members.

Clearly, it would appear that the inconsistent findings concerning the relative merits of cooperation and competition can be explained, in part, by the systematic bias that certain types of tasks imposed on either the cooperative or competitive conditions. Almost without exception, studies which have found cooperation to be more productive than competition seem to have employed tasks which intrinsically required cooperative effort in order to be successfully accomplished. In such instances, it is unreasonable and unjustifiable to compare cooperative and competitive conditions, since the competitive groups, by not being able to share information, stood little or no chance of successfully completing the assigned task. Similarly, however, studies which have found competition to be more productive than cooperation, almost without exception, seemed to employ tasks which did not require cooperative efforts in order to be successfully accomplished. In these instances, cooperation was not really needed because the tasks were of a nature that an individual could successfully solve or complete the task without any assistance from other members of his group. That is to say, whether or not he received assistance had little or no bearing on his or her ability to produce. Thus, if one considers the inconsistent results relative to the nature and demands of the tasks involved, the conclusion seems inescapable: From a methodological standpoint, the inconsistent findings are possibly the result of the fact that the tasks employed by the various studies often created a systematic bias in favor of either the cooperative or competitive condition; and

to the extent that the direction of this bias shifted, so did the results of that particular study. If one accepts such a possible explanation, than it seems obvious that the relative merits of cooperation and competition may continue to be uncertain until such a time when the nature of the task employed in the study will not give an inherent advantage to either the cooperative or competitive condition. Whether or not it is possible to devise such a task, however, is beyond the scope and intent of this paper.

Clearly, the empirical evidence does not present sufficient reason to conclude either that cooperation is superior to competition, or conversely, that competition is superior to cooperation, in so far as increasing group productivity is concerned. The fact is that the possible task-related biases inherent in much of the previous studies dealing with cooperation and competition, greatly limits the conclusions that one can confidently draw from the existing empirical evidence. There is, however, one conclusion that seems justifiable in view of the existing empirical evidence: That conclusion is simply that the relative merits of cooperation and competition are dependent on the situation at hand. That is to say, it is inappropriate to discuss the consequences of cooperation and competition on group productivity without also discussing the particular situation that one is referring to. The empirical findings seem to suggest the possibility that, among other things, the relative merits of cooperative and competitive behaviors are dependent on three situational variables: (1) The type of task involved; (2) The age of the people involved; and (3) The psychological

perspective of the persons involved.

First of all, the empirical evidence does seem to suggest that the consequential effects of cooperation and competition on group productivity may be dependent on the type of task which needs to be accomplished. Without trying to be redundant, the empirical evidence clearly suggests that a cooperative atmosphere within a group produces greater productivity when the task at hand requires group interdependence and sharing. On the other hand, the evidence also seems to suggest that the establishment of a competitive atmosphere within a group may actually produce greater productivity when the task at hand can be accomplished through coordinated, but individualized performances. As Bormann suggests:

> On occassion, an organization will want to use individual rewards. If managers wish to stimulate ingenuity to improve or increase productivity, individual incentives may be useful. If cohesiveness and task interdependency is a relatively minor feature of a loosely knit group in which most of the work is done by individuals in isolation, such as a group of writers, painters, or teachers, the rewards of individual incentive might prove to be more productive.[26]

In all fairness to both cooperation and competition, it must be stressed that the relative merits of each may be intrinsically bound to the particular task at hand.

Secondly, the empirical evidence does seem to indicate that the consequences of cooperative and competitive behaviors on group productivity may well be dependent on the age of the people involved. Specifically, an analysis of the populations of subjects used in the various cooperation and competition studies indicates that cooperation seems to be more productive when the subjects involved were either college students or adults

from the general population; while competition seemed to generate more productivity when the subjects involved were young children. Phillips, for example, found competition to be more productive when working with small groups of elementary school children. Similarly, Forlano's findings that competition produces greater productivity and enthusiasm was also based on a sample of elementary school children. Likewise, Sorokin et. al. found competition to be more productive than cooperation when working with pre-school and kindergarten children. On the other hand, without exception, every study which found cooperation to be more productive than competition, based its findings on a sample of either a college or general adult population. Whether or not this observed correlation is coincidental remains a question for further research.

Finally, from a psychological standpoint, it may be advanced that the consequential effects of cooperation and competition may be dependent on the psychological state of the people involved. Indeed, from a psychological point of view, it seems quite plausible that the age of the people involved will greatly influence the effects of cooperative and competitive behaviors. It may be advanced that competition is often more productive when working with young children because these youngsters have not yet been socially "indoctrinated" into believing that competition is "harmful" and cooperation is "beneficial." That is to say, until a child learns that he should cooperate and share with others in order to get along in society, the actual satisfaction of differential reward, as well as the feeling of competitive success, may be powerful motivating factors. Once he

becomes socially "indoctrinated," however, he may recognize that the same satisfactions of achievement can also come about through non-competitive and/or cooperative means. This subtle indoctrination, or re-orientation of his social behaviors, may account for the fact that the college sophomore reacts negatively to competition, whereas the third grader reacts quite positively.

The conclusions of this paper are obvious: First, it seems apparent that the empirical evidence does not make it "abundantly clear" that cooperation is a better facilitator of group productivity than competition. The inconsistent empirical findings clearly indicate that cooperation and competition represent social processes whose effects of group productivity and functioning are far from completely understood. Second, given the possibility that the inconsistent findings are the direct result of possible task-induced biases, it becomes evident that there is an eminent need for further research into the consequences of cooperative and competitive behaviors on group productivity. Finally, to the extent that the consequential effects of cooperation and competition are situationally bound, there is a definite need to explore the possible variables that could affect the relative merits of cooperation and competition. Clearly, there is much more to know.

FOOT NOTES

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APPENDIX ONE

INVESTIGATOR	GREATER PRODUCT	INTERDEPENDENCE	TASK
Deutsch (A)	Cooperation	High	Discussion
(B)	Cooperation	High	Puzzle
Grossack	Cooperation	High	Discussion
Miller	Cooperation	High	Puzzle
Mintz	Cooperation	High	Withdrawing cones
Smith et. al.	Cooperation	High	Discussion
Miller/Hamblin	Cooperation	High	Guessing numbers
Hammond/Goldman	Cooperation	High	Discussion
Jones/Vroom	Cooperation	High	Jigsaw puzzle
Blau	Cooperation	High	Employment placement
Thomas	Cooperation	High	Building houses
Raven/Eachus	Cooperation	High	Coordination problem
Moede	Cooperation	Low	Hand grip
Maller (A)	Competition	Low	Adding numbers
(B)	Competition	Low	Adding numbers
(C)	Cooperation	Low	Adding numbers
(D)	Competition	Low	Adding numbers
Phillips	Competition	Low	Twenty questions
Porlano (A)	Competition	Low	Cancellation test
(B)	Competition	Low	Cancellation test
(C)	Cooperative	Low	Cancellation test
Sims (A)	Competition	Low	Substitution test
(B)	Competition	Low	Reading test
Sorokin (A)	Competition	Low	Transferring marbles
(B)	Competition	Low	Sorting objects
Whittemore	Competition	Low	Printing
Philp (A)	Competition	Low	Transferring marbles
(B)	Competition	Low	Transferring marbles
de Charms	Competition	Low	Arithmetic
Scott/Cherrington	Competition	Low	Scoring examinations
Shaw (A)	Cooperation	High	Tracking problem
(B)	Cooperation	High	Yerkes multiple app.
Triplett	Competition	Low	Mechanical problem